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EXAMINER

WOZNIAK, JAMES S

ART UNIT PAPER NUMBER

2655

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/939,954

Applicant(s)

WHITMAN ET AL.

Examiner

James S. Wozniak

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) 19-26 and 44-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 27-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/27/2001</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Restriction Requirement*

1. In response to the restriction requirement from 8/25/2004, the applicant has filed a response on 9/27/2004, provisionally electing to prosecute the subject matter of Group I (Claims 1-18 and 27-43).

Thus, Claims 19-26 and 44-48 (Group II) are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a non-elected invention.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 7 and 33** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. **Claims 7 and 33** recite the limitation "the golden ratio of frequency" in line 3. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 1-5, 11, 15, 17, 27-31, 37, 41, and 43** are rejected under 35 U.S.C. 102(b) as being anticipated by Matityaho et al ("*Neural Network Based Model for Classification of Music Type*," *March 1995*).

With respect to **Claims 1 and 27**, Matityaho discloses:

Processing the audio signal into a perceptual representation of its constituent frequencies (*frequency analysis, Pages 1-2, Section IIA*);

Processing said perceptual representation into at least one learning representation of said audio data stream (*successive vectors representing music intervals for input to a neural network, Pages 1-2, Section IIA*);

Inputting at least one said learning representation into a multi-stage classifier, whereby said multi-stage classifier extracts classifying data from said learning representations and outputs the classification of said audio signal (*neural network input, Pages 1-2, Section IIA, and decision, Fig. 1, Page 2, Section IIB*).

With respect to **Claims 2 and 28**, Matityaho recites:

The step of processing the audio data into a perceptual representation of its constituent frequencies comprises calculating, for a time sample window of a digital representation of said audio signal, a Fast Fourier Transform function (*FFT, Pages 1-2, Section IIA*).

With respect to **Claims 3 and 29**, Matityaho discloses:

The step of processing said perceptual representation into at least one learning representation further comprises dividing said perceptual representation into a plurality of time slices (*successive vectors representing music intervals, Pages 1-2, Section IIA*).

With respect to **Claims 4 and 30**, Matityaho recites:

Each of said time slices is about 0.8 to about 1.2 seconds in length (*0.7 sec time interval, which is about 0.8 seconds, Page 5, Section IV*).

With respect to **Claims 5 and 31**, Matityaho discloses:

The step of dividing the perceptual representation into learning representations further comprises dividing said perceptual representation into a plurality of frequency bands (*frequency segments having a frequency separation, Pages 1-2, Section IIA, and Page 5, Section IV*).

With respect to **Claim 11 and 37**, Matityaho recites:

A final stage of said multi-stage classifier comprises a neural network (*neural network, Page 2, Section IIA-B*).

With respect to **Claims 15 and 41**, Matityaho discloses:

Classifying data comprises at least one of artist and genre (*music type, Page 1, Abstract*).

With respect to **Claims 17 and 43**, Matityaho recites:

Measuring the confidence of said classification by said multi-stage classifier (*success rate, Page 4, Section IIIB*).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 6, 16, 18, 32, and 42** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al.

With respect to **Claims 6 and 32**, Matityaho teaches the method and system for music classification utilizing multiple frequency bands as applied to Claim 5. Matityaho does not teach dividing a musical signal into 20 frequency bands, however, it would have been obvious matter of design choice to do so, since the applicant has not disclosed that the use of dividing a music signal into 20 frequency bands solves any stated problem or is for any specific purpose other than the fact that it is chosen based upon trial and error testing (*specification, paragraph 29*). The use of the 20 frequency bands for music signal division is akin to optimizing the values of a result effective variable (in this instance 20 frequency bands was determined as an optimal band number for effective machine learning through trail and error testing). Therefore, determining the optimal value of a result effective variable would have been obvious and ordinarily within the skill of the art. **In re Boesch**, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

With respect to **Claims 16 and 42**, Matityaho teaches the method and system for music classification as applied to Claim 1 and further teaches the sampled music input as shown in Fig.

1. Although Matityaho does not teach that the sampled signal was obtained using pulse code

modulation, the examiner takes official notice that pulse code modulation is a very common and well-known method of representing an analog audio input as a series of digital audio samples in the audio processing art. Thus, it would have been obvious to one of ordinary skill in the art, at the time of invention, to utilize PCM to obtain the music samples as shown in Fig. 1 of Matityaho to provide an easily implanted means of obtaining a sampled digital audio signal since the means for performing such a method step are well-known in the audio processing art and readily available.

With respect to **Claim 18**, Matityaho recites the method for music classification as applied to Claim 1. Also, although Matityaho does not specifically suggest method storage on a computer readable medium, the examiner takes official notice that it would have been obvious to one of ordinary skill in the art, at the time of invention, to store the music classification method taught by Matityaho on a computer readable medium to increase method compatibility and usability by providing a means for method use with multiple computer systems.

9. **Claims 7 and 33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Rossum et al (*U.S. Patent: 5,763,800*).

With respect to **Claims 7 and 33**, Matityaho teaches the method and system for music classification utilizing frequency band segmentation as applied to Claim 5. Matityaho does not specifically teach that frequency bands grow according to the golden ratio of frequency with respect to pitch; however, Rossum discloses:

The size of each of said frequency bands grows according to the golden ratio of frequency with respect to pitch (*frequency doubling with each octave, Col. 12, Lines 27-35*).

Matityaho and Rossum are analogous art because they are from a similar field of endeavor in music data processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with the teaching of frequency band doubling with increasing octaves as disclosed by Rossum to provide further perceptual processing for music classification by separating a musical signal into various frequency bands that are indicative of musical notes (Rossum, Col. 12, Lines 30-35, and Col. 3, Lines 58-62).

10. **Claims 8 and 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Goldin (*U.S. Patent: 5,969,654*).

With respect to **Claims 8 and 34**, Matityaho teaches the means for dividing a frequency analysis result into frequency segments, as applied to Claims 5 and 31. Although Matityaho does teach a maximum frequency of 20kHz based on the upper limits of human hearing (Page 1, Section IIA), a maximum of 11kHz is not specifically disclosed in the aforementioned prior art, however Goldin teaches a cutoff frequency of 11kHz (*Col. 3, Lines 33-47*).

Matityaho and Goldin are analogous art because they are from a similar field of endeavor in music data processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with a cutoff frequency of 11kHz as taught by Goldin to conserve system resources by processing only a necessary frequency range since a frequency bandwidth of up to 11KHz is satisfactory for describing music data (*Goldin, Col. 3, Lines 37-40*).

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11. **Claims 9-10 and 35-36** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Dumais et al (*U.S. Patent: 6,192,360*).

With respect to **Claims 9 and 35**, Matityaho teaches the method and system for music classification as applied to Claim 1. Matityaho does not teach the use of a support vector machine as a first stage of a multi-stage classifier, however Dumais recites:

First stage of said multi-stage classifier comprises at least one Support Vector Machine (use of support vector machines in pattern classification, Col. 10, Line 66- Col. 11, Line 15).

Matityaho and Dumais are analogous art because they are from a similar field of endeavor in pattern classification. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with the use of a support vector machine as a first stage of a multi-stage classifier as taught by Dumais to provide more accurate pattern classification through the use of a support vector machine (*Dumais, Col. 4, Lines 51-54*).

With respect to **Claims 10 and 36**, Dumais further discloses:

Multi-stage classifier comprises at least one Support Vector Machine per category of classification (*Col. 10, Line 66- Col. 11, Line 15*).

12. **Claims 12-13 and 38-39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Yoda (*U.S. Patent: 5,479,575*).

With respect to **Claims 12 and 38**, Matityaho teaches the method and system for music classification utilizing a neural network as applied to Claim 11. Matityaho does not specifically

suggest that the implementation of at least one input and output neural network nodes for each classification category, however, Yoda discloses:

The neural network comprises at least one input node per category of classification, and further wherein said neural net comprises at least one output node per category of classification (*Col. 6, Line 58- Col. 7, Line 19, and Fig. 5*).

Matityaho and Yoda are analogous art because they are from a similar field of endeavor in neural network based pattern recognition. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with the implementation of at least one input and output neural network nodes for each classification category as taught by Yoda to provide an organized and reliable means of pattern classification since each class has an associated input and output node utilizing in determining a most likely pattern classification based on the neural network output (*Yoda, Col. 5, Line 3-28*).

With respect to **Claims 13 and 39**, Matityaho additionally discloses:

The neural network comprises a hidden layer, wherein said hidden layer comprises at least as many nodes as the number of said input nodes (*hidden layer, Page 2, Section IIB*).

13. **Claims 14 and 40** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Kramer et al (*U.S. Patent: 5,335,291*).

With respect to **Claims 14 and 40**, Matityaho teaches the method and system for music classification utilizing a neural network as applied to Claim 11. Matityaho does not specifically suggest that the neural network operates on a Gaussian activation function, however Kramer discloses such a configuration (*Col. 4, Lines 33-44*).

Matityaho and Kramer are analogous art because they are from a similar field of endeavor in neural network based pattern recognition. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with the neural network configuration utilizing a Gaussian activation as taught by Kramer in order to implement a more detailed and thorough method of pattern recognition through the use of activation rules which provide a mathematical description of how each node in the neural net processes information (*Kramer, Col. 1, Lines 38-47*).

### ***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Knowles et al (*U.S. Patent: 5,546,477*)- teaches a frequency based coding method utilizing octave based frequency bands.

Brady et al (*U.S. Patent: 5,619,616*)- discloses a method for the classification of an audio signal using a neural network.

Blum et al (*U.S. Patent: 5,918,223*)- teaches a method for music data identification utilizing feature vectors.

Yourio (*U.S. Patent: 6,201,176*)- discloses a method for music identification according to frequency components of an audio signal.


Weare et al (*U.S. Patent: 6,657,117*)- teaches a perceptual music classification system, similar to the present invention, utilizing a neural network, octave frequency bands, and genre and artist data for classification.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669 and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached at (703) 305-4827. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak  
1/18/2004



DAVID L. OMETZ  
PRIMARY EXAMINER